REMARKS

Claims 1-38 are pending in the above application. Claims 1-17 are cancelled without prejudice by the foregoing amendment.

Claims 1-7, 10-28 and 31-38 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sage, Jr. (U.S. Patent No. 6,436,476 B1) in view of Adzima et al. (P.C.T. Publication No. WO 91/15434) and further in view of Yamada et al. (U.S. Patent No. 4,427,482). Applicants respectfully traverse the Examiner's rejection.

The present invention of claims 1-38 describes a reinforcing fiber having a chemical treatment, therein forming a string binder. A string binder, as described in previous responses, describes a fibrous material having a resin binder. Further, the fibrous material, as described on pages 6 and 7 of the original specification, is preferably in the form of continuous strands composed of multiple filaments. The strands may take the form of yarns, or rovings. Preferably, the strands of fibrous substrate comprise reinforcing fibers. Typically, such strands are formed by combining filaments of the reinforcing fibers as they are attenuated from a fiber-forming apparatus such as a bushing or orifice plate, although they may also be made by any method conventionally known in the art. The filaments may be coated with a suitable sizing composition. For example, a suitable sizing composition may comprise functional agents such as lubricants, coupling agents and film-forming polymers. After being coated with the sizing composition, the filaments may be gathered into strands. These strands may then be formed into yarns or rovings. Preferably, the filaments making up the strands are glass and have a diameter preferably ranging from 3.5 to 24 μm and more preferably from 9 to 13 μm. The preferred filament diameters correspond to U.S. filament designations G, H, and K. In the method according to the invention, preferably the strand input has a yield of from 3,700 to 7,500 yd/lb., most preferably 7,500 yd/lb., or

approximately 66 TEX (g/km a measurement reflecting the weight and thickness of the strand).

A preform is then formed from the string binder by chopping the string binder onto a mold and melting the resin binder to bind together the chopped fibrous strands. A reinforced composite is made by placing a "charge" of the preform in a mold, injecting a polymer matrix resin onto and within the preform, and curing the polymer matrix resin.

The small size (3,700-7,500 yd/lb, or 66 TEX) of the fibrous material of the string binder is important in forming the preform, as the smaller fibrous materials allows more bonding among and between individual chopped strands per unit area. Further, smaller strands may migrate more easily within the mold during the curing process to form a composite part having uniform fiber distribution. Hence, a smaller "charge" of string binder may be introduced in the mold to form the reinforced composite. Where larger fibers are used in other applications, the size of the "charge" of the preform must substantially match the size of the mold, as the larger fibers do not migrate easily through the curing resinous material. Hence, coated fibers of larger sizes are not considered "string binders" by those of ordinary skill in the art.

Applicants have herein amended independent claims 18 and 22 to emphasize the small size of the fibrous material used in string binders. Applicants respectfully submit that no new matter has been added by the amendments. Further, Applicants believe that the amendment only clarifies what was previously presented with respect to these claims, and hence the amendment simplifies matters for review in this Response.

As stated in previous Responses, Sage Jr., Adzima et al., or Yamada, alone or in combination, do not disclose a string binder, contrary to the Examiner's conclusion. Further, none of these references, alone or in combination, disclose or suggest the addition of a filler material to the composition of the resin component of the string binder that reduces surface fiber prominence and blistering of composite articles.

The Sage Jr. reference is directed to the process for making a composite article and a composition for coating glass and or other fiber reinforcement to improve the fiber's compatibility and adhesion to a polyolefin resin. The process begins by coating fibers with a coating composition including a silane, an optional pH modifying agent, and an optional lubricant, wherein the silane is compatible with one or more ROMP catalysts. As noted in column 5, lines 32-55, the coating composition may include an optional film former such as an epoxy, polyurethane, or epoxy polyurethane. The coated fibers are then contacted with an uncured cycloolefin resin and one or more ROMP catalysts. The Sage Jr. reference utilizes a specific DCP resin and one or more ROMP catalysts that the present invention does not contemplate. The Sage Jr. reference does not form a string binder that can be chopped and formed into a preform, and then subsequently placed into a mold as a "charge" that can be combined with a polymer matrix resin to form a composite article. Hence, the Sage Jr. reference does not disclose a string binder, contrary to the Examiner's conclusion. Further, the Sage Jr. reference, as the Examiner concedes, does not disclose or suggest the addition of a filler material to the composition of the resin component of the string binder that reduces surface fiber prominence and blistering of composite articles.

Yamada teaches a method for preparing a prepreg roving and preforms and molded articles made there from. As stated in Column 8, line 59 of the Yamada reference, the glass roving that is preferably utilized is 2,400 g/km (i.e. 2,400 TEX), which is substantially thicker than the 66 TEX roving used in the present invention.

Preforms made with the Yamada prepreg roving would have substantially less bonding of chopped strands per unit area as compared with the presently claimed invention. Further, because the strands are significantly larger and migrate less during the curing process, a significantly larger "charge" of preform would be required to form the composite article. Hence, Applicants respectfully submit that Yamada does not teach a string binder as described and claimed in the present invention, much less does Yamada teach a string binder that reduces surface fiber prominence and blistering of composite articles by the addition of a filler material to the chemical treatment. Instead, Yamada discloses a coated roving that is not in the form of a string binder.

Adzima et al. describes a coating composition useful for glass strands having a thermoplastic resin polymer with a film forming polymer that are especially useful as an overwrap for a fiber optical cable. In one embodiment, the powder-coated strand is wrapped around a cable or cord and subsequently extruded with a thermoplastic jacket. The heat of the molten thermoplastic polymer in extrusion process causes the thermoplastic resin polymer powder in the overwrap to melt and flow and fuse the jacket to the coating composition. The Adzima et al. reference is simply not analogous art to the presently claimed invention.

Further, even assuming that the Adzima et al. reference is analogous art, which the Applicants do not concede, the Adzima et al. reference does not describe a string binder that is subsequently chopped onto a preform and melted to bind together the chopped fibrous strands. The Adzima et al. reference does not subsequently take the perform to form a composite article. In fact, the strands are maintained in one form (a glass strand used in the overwrap) throughout the process. In fact, it is likely that thicker fiber strands would be preferred over thinner fibers for use in the overwrap, which is inapposite of the presently claimed invention. Further, the present invention

as in currently presented claims 18 and 22, does not utilize a powder coating, but instead utilizes an aqueously applied chemical treatment.

Further, the Adzima et al. reference, as the Examiner concedes, does not disclose or suggest the addition of a filler material to the composition of the resin component that reduces surface fiber prominence and blistering of composite articles. In fact, it is not necessary in the Adzima et al. reference, as the fibrous component is maintained within a thermoplastic outer covering, and hence fiber prominence is not an issue.

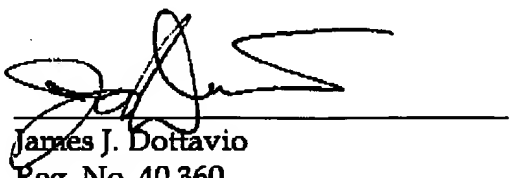
As such, Applicants respectfully submit that, contrary to the Examiner's analysis, claims 18-38 are not obvious over the combination of the cited references. Reconsideration of claims 18-38 is thus respectfully requested.

Claims 8-9 and 29-30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sage, Jr. (U.S. Patent No. 6,436,476 B1) in view of Adzima et al. (P.C.T. Publication No. WO 91/15434) and further in view of Yamada et al. (U.S. Patent No. 4,427,482), as applied to claims 1-7 and 10-21, in further view of "Epi-Cure 3253" Product Data Sheet and Hawley's Condensed Chemical Dictionary.

For reasons stated in previous responses with respect to claims 18-28 and 31-38, the present invention is directed to a string binder that is not disclosed in Sage Jr., Adzima et al., or Yamada. The product data sheet and dictionary definition similarly are not directed to a string binder. As such, claims 29-30 are non-obvious in view of the cited prior art. Reconsideration of claims 29-30 is respectfully requested.

In view of the foregoing amendments and remarks, Applicants submit that claims 18-38 are allowable. The Examiner is invited to telephone the Applicants' undersigned attorney, at (740) 321-7167 if any unresolved matters remain.

Respectfully Submitted,



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